

REMARKS

The Office Action

Claims 1-34 and 62 are pending. Claims 1-9, 11-28, 34, and 62 are under consideration. Claims 1, 3, 11-13, 23, and 27-28 stand rejected for anticipation by Oswald (GB 1348045). Claims 1-9, 11-28, 24, and 62 stand rejected for anticipation by Kanemura et al. (U.S. Patent No. 5,374,668; hereafter "Kanemura"). Claims 2, 4-9, 14-22, 24-26, 34, and 62 stand rejected for obviousness over Oswald in view of Hubbell et al. (WO 00/44808; hereafter "Hubbell").

Amendment to the Claims

Claim 11 has been amended to correct two typographical errors. No new matter has been added.

Rejections under 35 U.S.C. § 102

Claims 1, 3, 11-13, 23, and 27-28 stand rejected for anticipation by Oswald, and claims 1-9, 11-28, 34, and 62 stand rejected for anticipation by Kanemura. In order to anticipate a claim, a reference must teach every element of the claim (M.P.E.P. § 2131). Applicants note that the instant claims are directed to methods and not compositions of matter, and in order for the cited references to be anticipatory, they must teach each step of the method recited in the claims. Both Oswald and Kanemura fail to do so.

The Invention

Claim 1, from which claims 2-9, 11-28, 34 and 62 depend, recites:

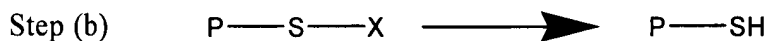
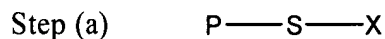
1. A method of synthesizing a block copolymer, said method comprising the steps of:

(a) providing a first compound comprising a polymeric thiol precursor;

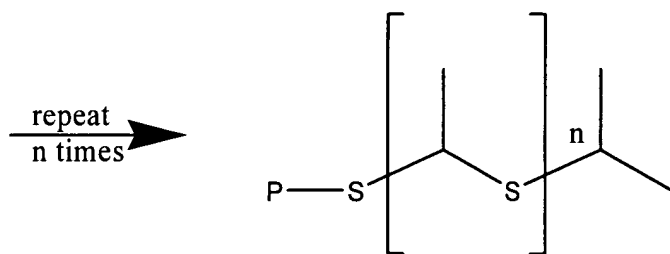
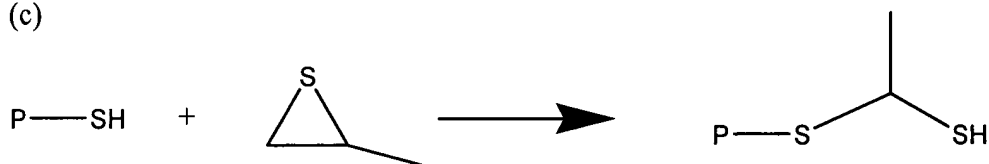
(b) generating a polymeric thiol from said first compound; and

(c) initiating a polymerization of a second compound comprising an episulfide group with said thiol produced in step (b) thereby producing a block copolymer comprising a terminal thiol. (Emphasis added)

A schematic depiction of the method is as follows¹:



Step (c)



With reference to this scheme, the method requires (a) the provision of a first compound including the polymeric thiol precursor, i.e., P-S-X; (b) the generation of a polymeric thiol, i.e., P-SH from the first compound; and (c) the initiation of polymerization of an

¹ The scheme depicts the polymerization of propylene episulfide as a non-limiting example.

episulfide, i.e., propylene episulfide in this scheme, by the polymeric thiol to produce a block copolymer having a terminal thiol. The polymerization is initiated by the polymeric thiol reacting with one episulfide, which results in the addition of one episulfide monomer to the polymeric thiol and the generation of a new thiol. This process is then repeated (n) times in order to generate a block of polymerized episulfide bound to the polymeric thiol, i.e., the block copolymer.

The specification also defines “thiol precursor” as follows:

By a “thiol precursor” is meant any compound able to generate thiols as initiators for the in situ polymerization of episulfides. The thiol precursor may be thioesters, dithioesters, xanthates, dithiocarbamides, trithiocarbonates, or any compound, which, by nucleophilic attack, undergoes transesterification or transamidation reaction; a free thiol is generated and then deprotonated by a base, which can be the nucleophile itself or a non-nucleophilic compound, such as a tertiary amine (Fig. 1).... (pg. 6, ll. 17-23).

The use of a thiol precursor prevents the thiol from reacting until the appropriate point in a synthetic strategy, e.g., when the episulfide is added. This ability enables the isolation, purification, and storage of the thiol precursor without the presence of undesirable reactions, e.g., disulfide bond formation.

Oswald

Regarding Oswald, the Office states that it “discloses a method for forming polythioethers by reacting episulfides with thiol compounds ... for the present claim 1.”

While the Office is correct in what Oswald discloses, the syntheses of Oswald do not teach the limitations of claim 1 because there is no teaching of any thiol precursor, much

less the generation of a thiol from the precursor prior to a polymerization reaction. The entire Oswald disclosure is directed to “reacting episulfides with thiols” (pg. 1, l. 8; emphasis added), and the sections cited by the Office support this view. For example, page 1, line 36 of Oswald states: “episulfides are reacted with thiol compounds,” page 2, line 5 depicts an episulfide, and page 2, lines 41-57 begins with “[t]he thiol reactants suitable for use in the practice of this invention are presented by the general formula: $R(SH)_m...$ ” (emphasis added). In contrast, the instant claims require the provision of a thiol precursor, which is distinct from a thiol. Oswald simply does not teach the use of a thiol precursor as recited in claim 1, and the rejection should be withdrawn. Furthermore, as Oswald fails to teach the limitations of claim 1, it is unnecessary to discuss the rejections of the dependent claims.

Kanemura

Regarding the rejection over Kanemura, Applicants again emphasize that claim 1 is directed to a method and not a composition of matter. Thus, the components of the compounds of Kanemura are irrelevant to patentability absent their being produced by the instantly claimed method, and the Office’s assertions that certain compounds read on the instant claims are misplaced. As noted by the Office, Kanemura discloses a polysulfide based compound. The only method disclosed in Kanemura is recited on col. 8, ll. 9-16, which states:

the epoxy resin, polythiol having at least two mercapto groups, and an internal releasing agent are mixed. If necessary, a catalyst and other

additives are further added, the mixture is deaerated fully, and the uniform monomer/additive mixture is cast into a mold, and is polymerized.
(emphasis added)

This method relies on mixing an epoxy resin with a polythiol having two mercaptogroups (i.e., free thiols). Nowhere does Kanemura disclose providing a thiol precursor and then generating a thiol from it, as recited in claim 1. Indeed, all of the compounds recited by Kanemura on cols. 4-6 contain free thiol groups. Since Kanemura does not teach steps recited in the instant claims, it cannot anticipate the instant claims, and the rejection should be withdrawn.

Again, since Kanemura fails to teach the limitations of claim 1, it is unnecessary to address the rejection of the dependent claims. However, with respect to claims 6 and 11, Applicants provide the following additional arguments. Claim 6 requires that the first compound include both a polymeric thiol precursor and a hydrophilic polymer, which in turn must include a polar, ionic, or ionizable group. That is, the ionic group recited in claim 6 is bound to the hydrophilic polymer. In contrast, Kanemura recites the addition of ionic surface active agents to a resin, where the agents are not bound to the resin. Thus, the ionic surface active agents of Kanemura are not relevant to the patentability of instant claim 6. Finally, claim 11 recites specific thiol precursors, i.e., a thioester, a dithioester, a thiocarbamate, a dithiocarbamate, a thiocarbonate, a xanthate, and a trithiocarbonate, which may be employed in the instant claims, and, in contrast to the Office's assertion, a "polythiol compound having two or more functional groups" does not read on these specific groups. In order to anticipate claim 11, Kanemura must

disclose one of the polymeric thiol precursors recited in claim 11, and Kanemura simply does not.

Rejections under 35 U.S.C. § 103

Claims 2, 4-9, 14-22, 24-26, 34, and 62 stand rejected for obviousness over Oswald and Hubbell. To support an obviousness rejection, the Office must put forth a *prima facie* case that meets the legal standard for obviousness found in M.P.E.P. § 2142.

This section states:

To establish a *prima facie* case of obviousness, three basic criteria must be met. First, there must be some suggestion or motivation, either in the references themselves or in the knowledge generally available to one of ordinary skill in the art, to modify the reference or to combine reference teachings. Second, there must be a reasonable expectation of success. Finally, the prior art reference (or references when combined) must teach or suggest all the claim limitations. The teaching or suggestion to make the claimed combination and the reasonable expectation of success must both be found in the prior art, and not based on applicant's disclosure.

This standard has not been met in the present case. The combined references fail to teach or suggest the invention.

The Office relies on Oswald to teach the limitations of claim 1 and Hubbell to teach limitations of certain of the dependent claims. As stated above, Oswald does not teach the limitation of claim 1, and, thus, the rejection should be withdrawn.

CONCLUSION

Applicants submit that the claims are in condition for allowance, and such action is respectfully requested. Enclosed is a petition for extending the period for reply for three months, to and including July 7, 2005. If there are any charges or any credits, please apply them to Deposit Account No. 03-2095.

Date:

July 7, 2005

Respectfully submitted,

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